

# Turf Insect Management

Maine Pesticide Applicator Training  
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# Topics to cover

- Review current turf insecticides
  - Which ones should I use on which insect?
- Annual white grubs
- May / June beetles (*Phyllophaga* grubs)
- Chinchbugs



# Insecticide options

- Neonicotinoids
- Pyrethroids
- Combination products
- Organophosphates and carbamates
- Anthranilic diamides

# Neonicotinoids

- clothianidin (Arena<sup>TM</sup>)
- imidacloprid (Merit<sup>TM</sup>)
- thiamethoxam (Meridian<sup>TM</sup>)

# Neonicotinoids

- systemic through roots
- relatively slow acting
- relatively persistent
- impact on honey bees???

# Neonicotinoids

- **Arena<sup>TM</sup>, Meridian<sup>TM</sup>**
  - some translaminar activity
  - A LITTLE quicker acting than Merit<sup>TM</sup>
- **Merit<sup>TM</sup>**
  - Slower to work, does not last as long as others

# Pyrethroids

- bifenthrin (Talstar™)
- cyfluthrin (Tempo™)
- lambda-cyhalothrin (Scimitar™)
- deltamethrin (Deltagard™)
- And more!

# Pyrethroids

- Virtually insoluble in water
- Bind quickly to thatch or soil (and therefore **NOT effective on soil insects**)
- Relatively quick acting
- Can be toxic to bees and other pollinators

# Combination products

- a neonicotinoid (good against white grubs)
- plus a pyrethroid (good against “everything else”)

# Combination products

- A neonicotinoid plus a pyrethroid
  - Allectus™
    - Merit™ plus Talstar™
  - Aloft™
    - Proprietary blend of chlothianidin and bifenthrin

# Organophosphates and carbamates

- carbaryl (Sevin<sup>TM</sup>)
- trichlorfon (Dylox<sup>TM</sup>)

# Dylox™ (trichlorfon)

- begins to kill grubs 1 to 3 days after application
- breaks down 7 to 10 days after application
- **highly soluble**, moves readily through thatch (and sandy soils)
- **alkaline hydrolysis**

# Alkaline hydrolysis

- Some insecticides break down when tank water has high pH ( $>7.5$ )
  - alkaline = “basic” (pH above 7)
  - hydro = water
  - lysis = breakdown

# Sevin™ (carbaryl)

- begins to kill grubs 3 to 7 days after application
- stays active 2 to 3 weeks
- highly soluble, moves readily through thatch (and sandy soils)
- alkaline hydrolysis
- very inconsistent

# Anthranilic diamides

- chlorantraniliprole (Acelepryn™)
  - new mode of action
  - very low toxicity to vertebrates
  - does not require signal word (in US)
  - excellent on white grubs and more

# Anthranilic diamides

- chlorantraniliprole (Acelepryn™)
  - best when applied between mid April and early June

# Anthranilic diamides

- cyanantraniliprole (Ference™)
  - Works a little more quickly than Acelepryn™
  - Does not last as long

# Topics to cover

- Review current turf insecticides
- **Annual white grubs**
- May / June beetles (*Phyllophaga* grubs)
- Chinchbugs



# White Grub Adults



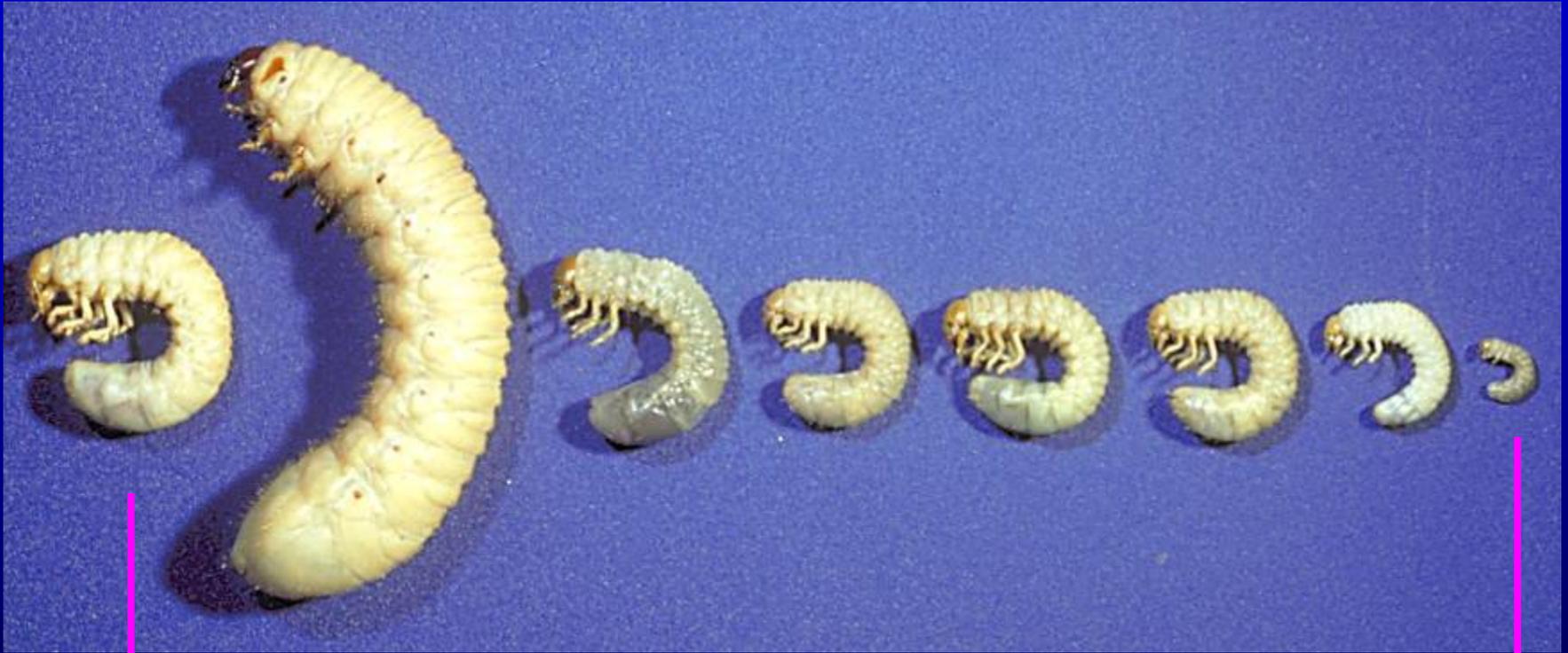
Annual Grubs

GJB, EC, SMC, NMC, JB, OB, AGB

Multi-year Grubs, M/JB

Multi-gen/yr Grub, BTA

# White Grub Third Instars



Annual Grubs

GJB, EC, MC, JB, OB, AGB

Multi-year Grubs, M/JB

Multi-gen/yr Grub, BTA



Japanese beetle

# Japanese beetle

- Most widely distributed throughout the Northeast
- More susceptible to many insecticides than other grub species
- More susceptible to some entomopathogenic nematodes
- Japanese beetle traps available

# European chafer



# European chafer

- Spreading throughout New England and New York, in Ontario and Quebec
- Less susceptible to some insecticides (partly because the largest species)
- Life cycle two weeks **EARLIER** than JB
- **Least sensitive to cold**, so feeds later in fall and earlier in spring

Oriental beetle



# Oriental beetle

- Mostly coastal areas (coastal NE, Long Island), Connecticut River Valley
- LESS susceptible (than JB) to some insecticides
- Pheromone has been identified
- Life cycle similar to Japanese beetle

Asiatic garden beetle



# Asiatic garden beetle

- Probably widespread but not too damaging
- Smallest species but most aggressive
- **NOT susceptible to Merit™**
- Usually prefers less well-maintained turf













**MASKED CHAFER  
(Annual White Grub)  
LIFE CYCLE**

JAN

FEB

MAR

APR

MAY

JUN

JUL

AUG

SEP

OCT

NOV

DEC

# White grub biology

- One generation per year
- Adults fly in June - September
- Grubs active in fall and spring
- Overwinter as grubs below frost line



**MASKED CHAFER  
(Annual White Grub)  
LIFE CYCLE**

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
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# White grubs

- Life cycle
- Grub behavior
- Sampling and tolerance levels
- Control strategies

# Grub behavior

- EC – least sensitive to cold, feeds longer in fall and starts again earlier the next spring

# Grub behavior

- Vertical movement
  - Some species (*Phyllophaga* in Texas) can move
- Lateral movement
  - Many species can move several inches per day if they need to

# Grub behavior

- Feeding behavior
  - Feed on roots and root hairs AND THATCH
- Soil preference
  - Usually prefer sandy or “light” soils (easier to move through), but can occur anywhere



# Conducting field trials



# Japanese beetle pheromone trap

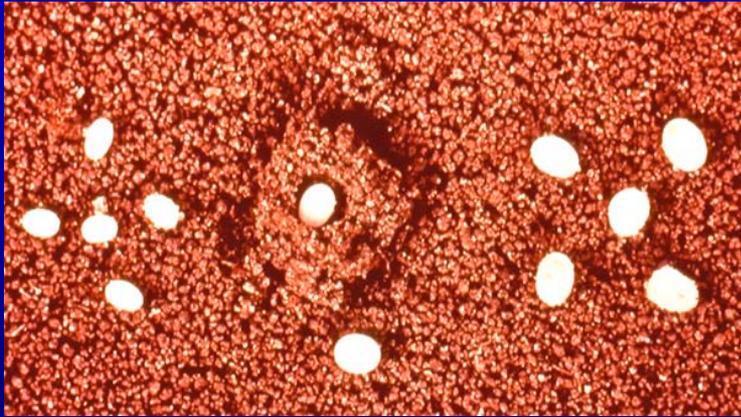


# Cultural Controls of Grubs

- Use cultural controls to mask damage or minimize secondary damage
  - Irrigation – deter or delay egg laying
  - Fertilization – Milorganite™ ???
  - Mowing – raise mowing height
  - Aerification – mechanical destruction of grubs
  - Manage skunk and raccoon activity

Photo: B. McGraw

# Soil moisture and grubs



- Scarab eggs need soil moisture to survive
- If soils are too dry, females will delay oviposition for several weeks, until moisture improves

# Soil moisture and grubs

- European chafers prefer dry soils (but can tolerate flooding for 7 days too!!!)
- Oriental beetles quick to move down in soil profile when too hot or dry
- Japanese beetles prefer irrigated sites



# Milorganite™ ???



- Dave Shetlar (Ohio State Univ.) reports that Milorganite™ deters skunks from rummaging in a grub-infested area

# Can aerification mechanically destroy grubs?



# What kind of grub mortality can be expected in reality?

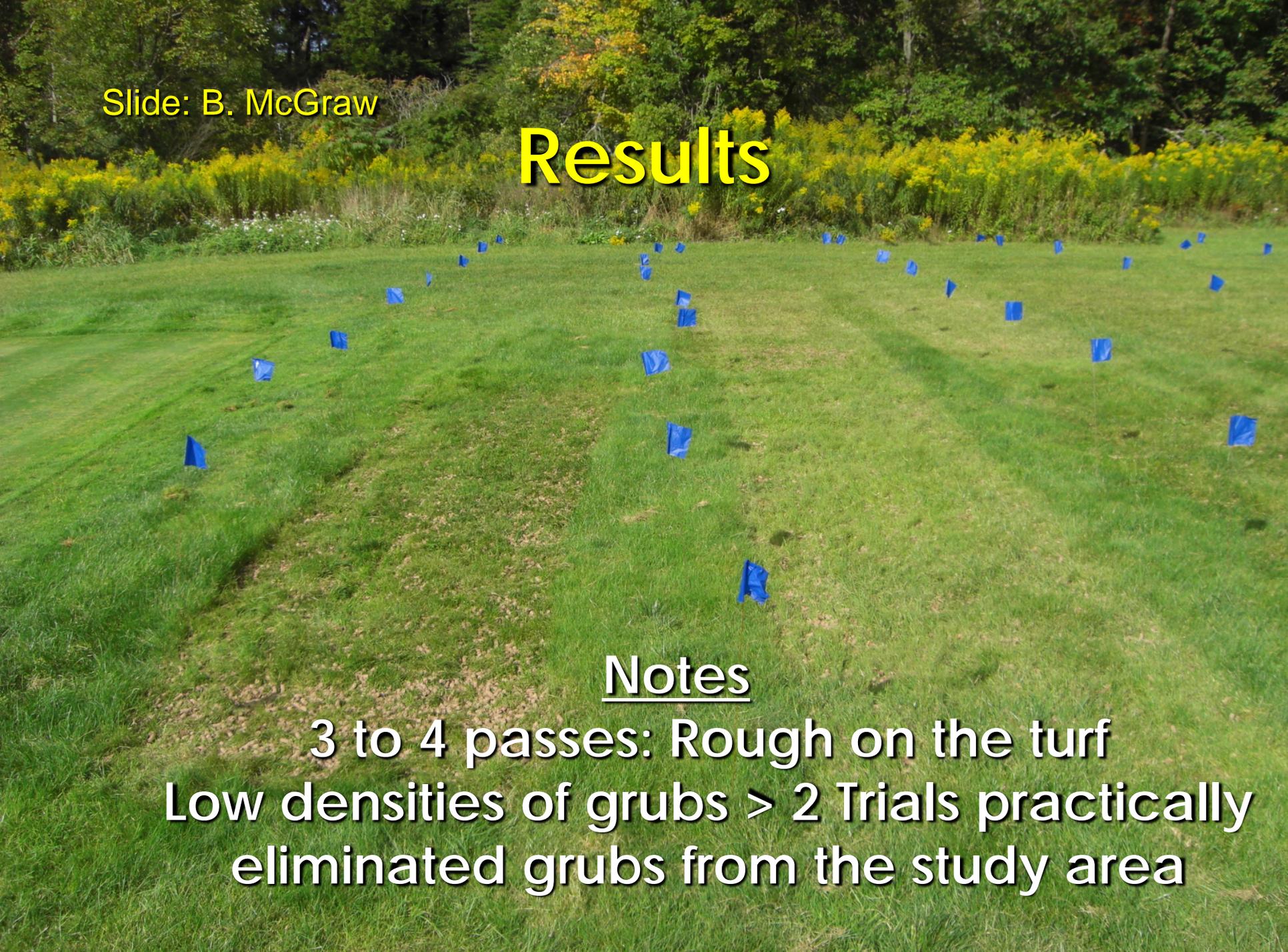
Replicated, small plot trials (2009-11)

- Variables examined:
  - Diameter ( $3/8''$  and  $1/2''$ ), Hollow & Solid
    - Spacing (1.5, 2, 3'')
  - Hypothesis: Tight spacing + Lg. diameter = greatest mortality

Slide: B. McGraw

Slide: B. McGraw

# Results



## Notes

3 to 4 passes: Rough on the turf  
Low densities of grubs > 2 Trials practically  
eliminated grubs from the study area



# Does Type of Tine Matter?

**So far....no significant differences  
between tines of the same diameter**

# Can aerification mechanically destroy grubs?

Yes but:

- depends on diameter of tine and spacing
- more mortality with more “passes” (but more damage too)
- effect is minimal when grub populations are low

# Manage skunks



Photo: P. Vittum

# Chemical control options





**MASKED CHAFER**  
**(Annual White Grub)**  
**LIFE CYCLE**

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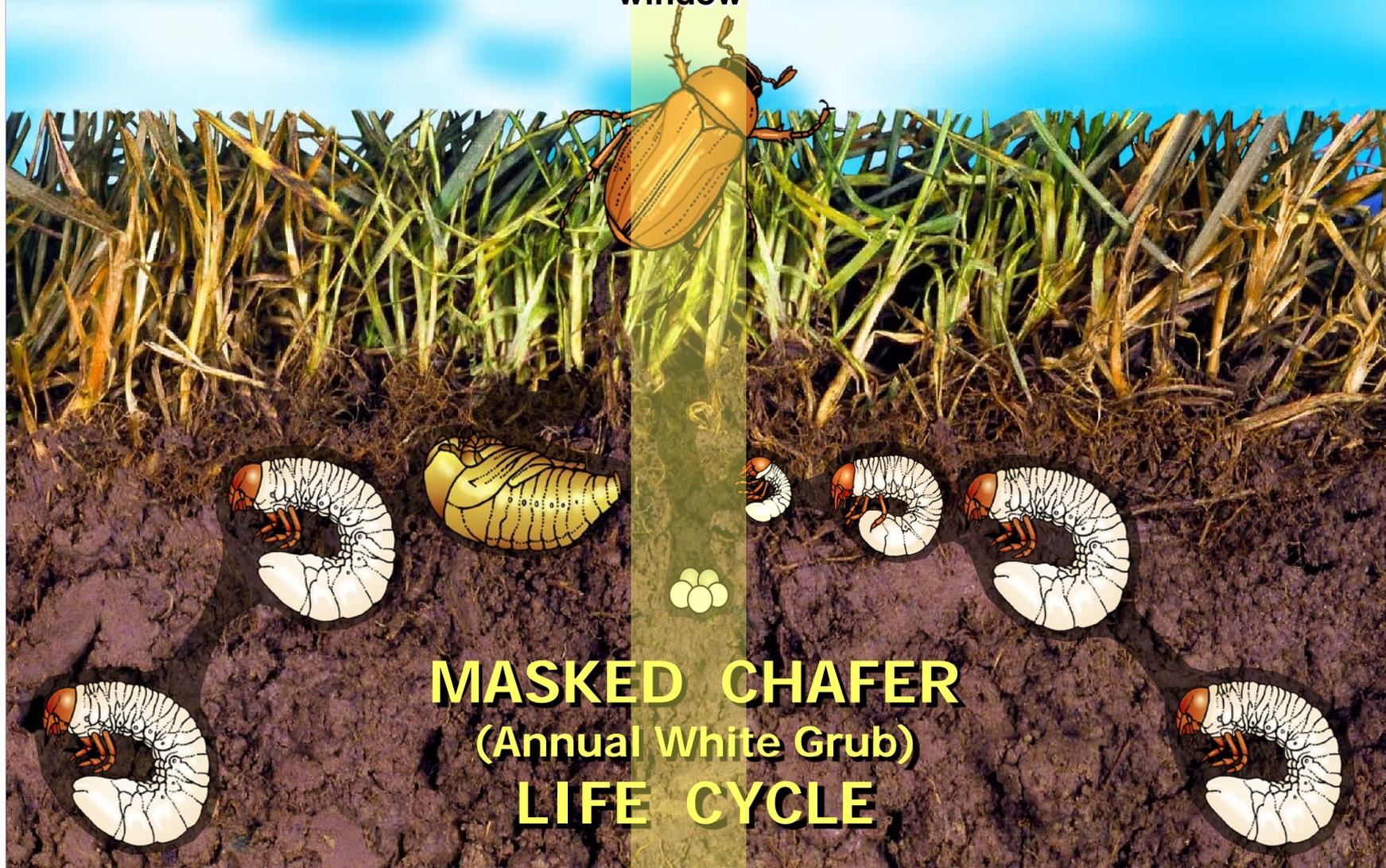
SEP

OCT

NOV

DEC

Preventive  
window



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# White grubs - preventive

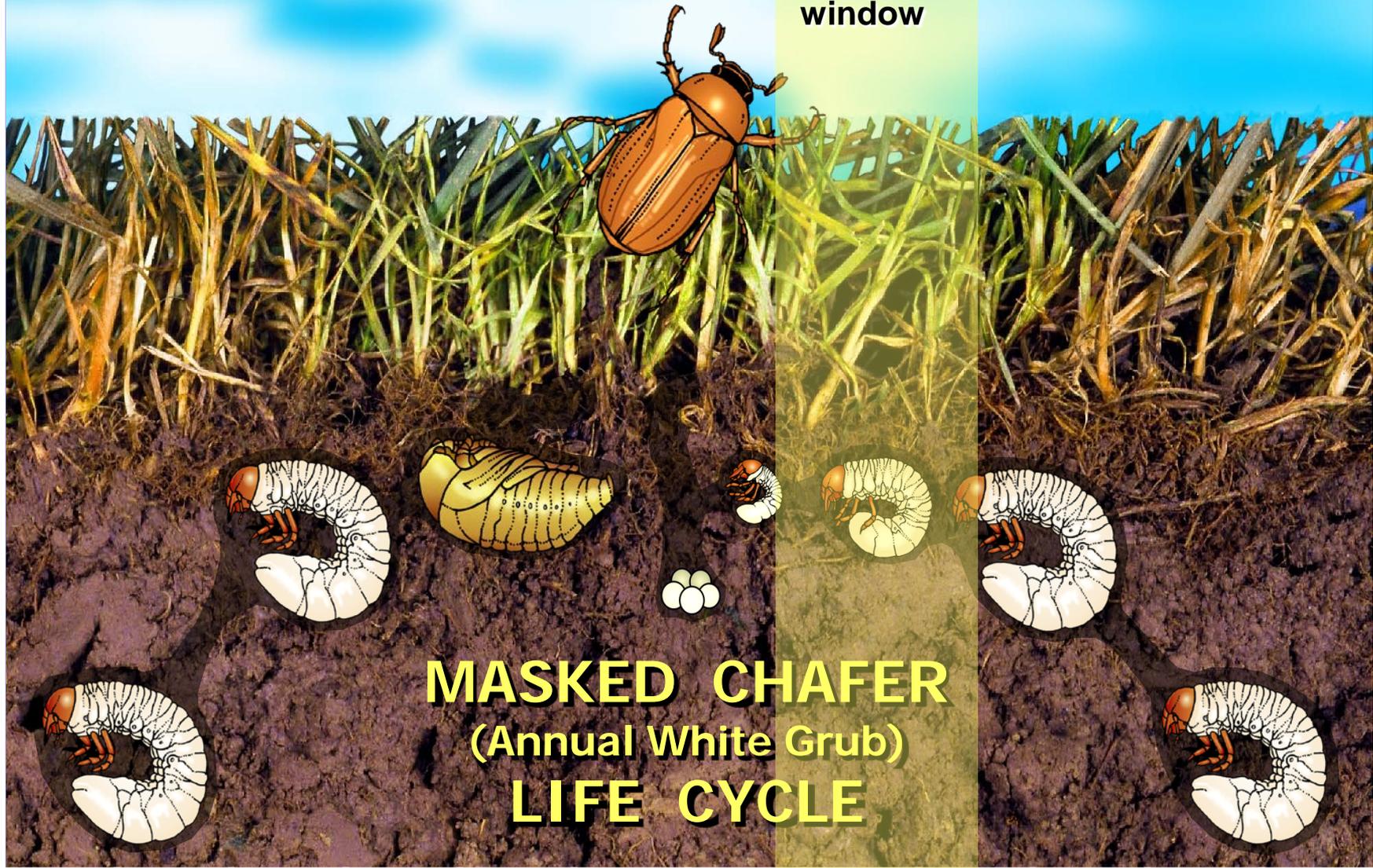


- a **neonicotinoid** when adults are laying eggs
- **combination product** when adults are laying eggs
- **chlorantraniliprole** (Acelepryn™) from mid April to mid June

# chlorantraniliprole (Acelepryn™)

- Needs to be applied in spring (mid April to mid June)
  - takes time to be taken up through the roots
  - needs to get through the thatch
  - Syngenta guarantees the product
- Effective against white grubs, billbugs, caterpillars, and ABW

Curative  
window



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(Annual White Grub)  
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# White grubs - curative

- trichlorfon (Dylox™)  
as soon as grubs active
- mid Aug to late Sept  
(soil >60 F)
- some restrictions on  
use because of  
solubility



# White grubs - curative

- carbaryl (Sevin™) as soon as grubs active
- very **inconsistent**
- some restrictions on use because of solubility



# White grubs - curative



- both trichlorfon and carbaryl are very soluble in water and sensitive to high pH
- alkaline hydrolysis
- not on school grounds in Massachusetts

# White grubs - curative

- Neonicotinoids???
  - UMass trial in 2008
    - Arena, Aloft, Merit, Meridian, Dylox
  - applied 17 Sept
  - sampled 9 DAT
    - only Dylox reduced grub counts
  - sampled 30 DAT
    - all reduced grub counts but Merit less effective





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(Annual White Grub)  
LIFE CYCLE**

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Whatever you use, water it in!!!



[extension.umass.edu/turf](http://extension.umass.edu/turf)

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# Chinchbugs



# Chinchbugs



# Hairy Chinch Bug

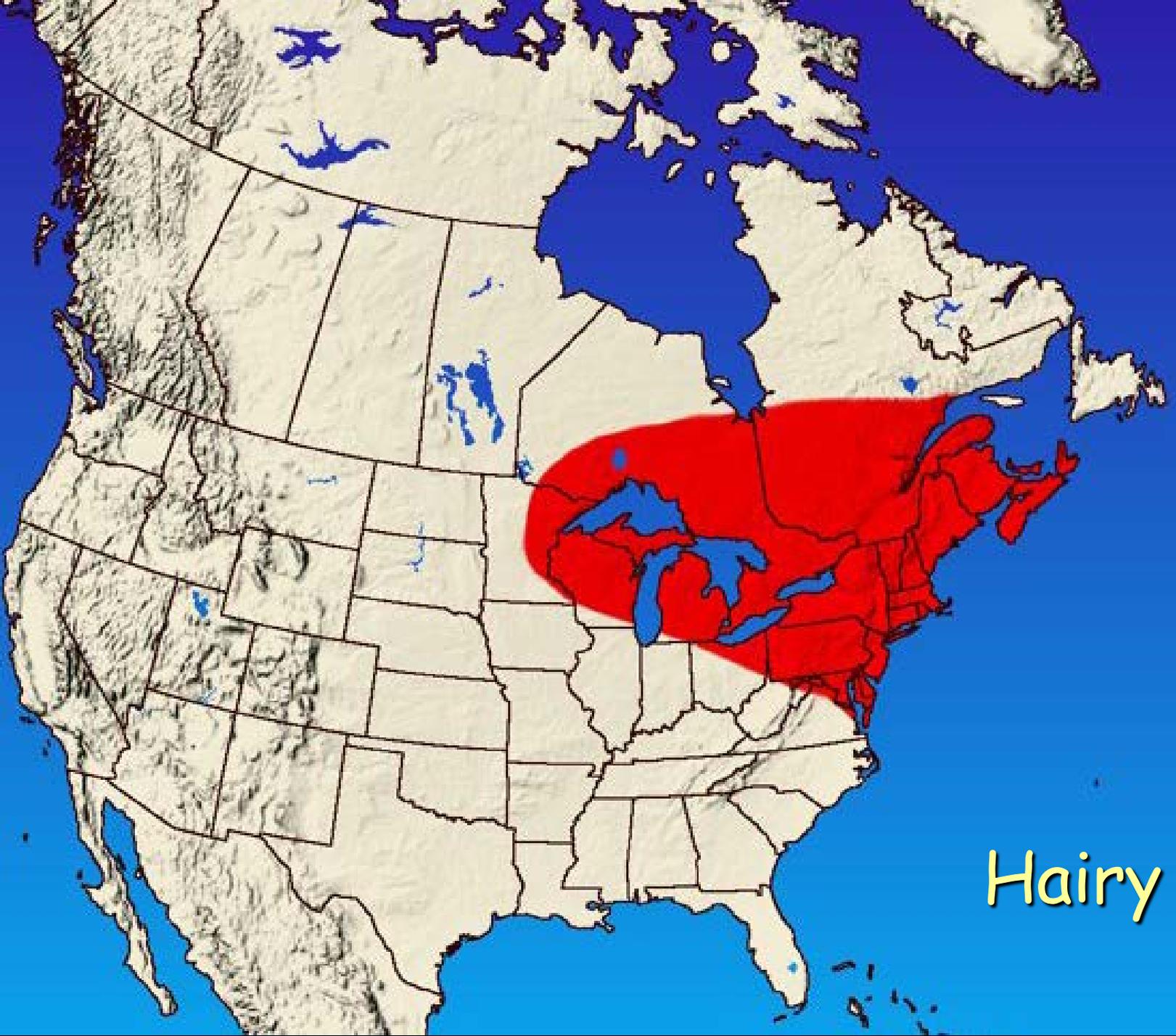
*Blissus l. hirtus*



# Hairy Chinch Bug

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- Found in all northern states from Minnesota to New England, south through Virginia
- Major pest in CT, NJ, NY, OH, MI and eastern Canada



Hairy

# Hairy Chinch Bug

## Host plants

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- Most cool season turfgrasses
- Especially fescues, perennial ryegrass, Kentucky bluegrass
- Creeping bentgrass at lawn height, but rarely on putting greens

# Chinch Bug Biology

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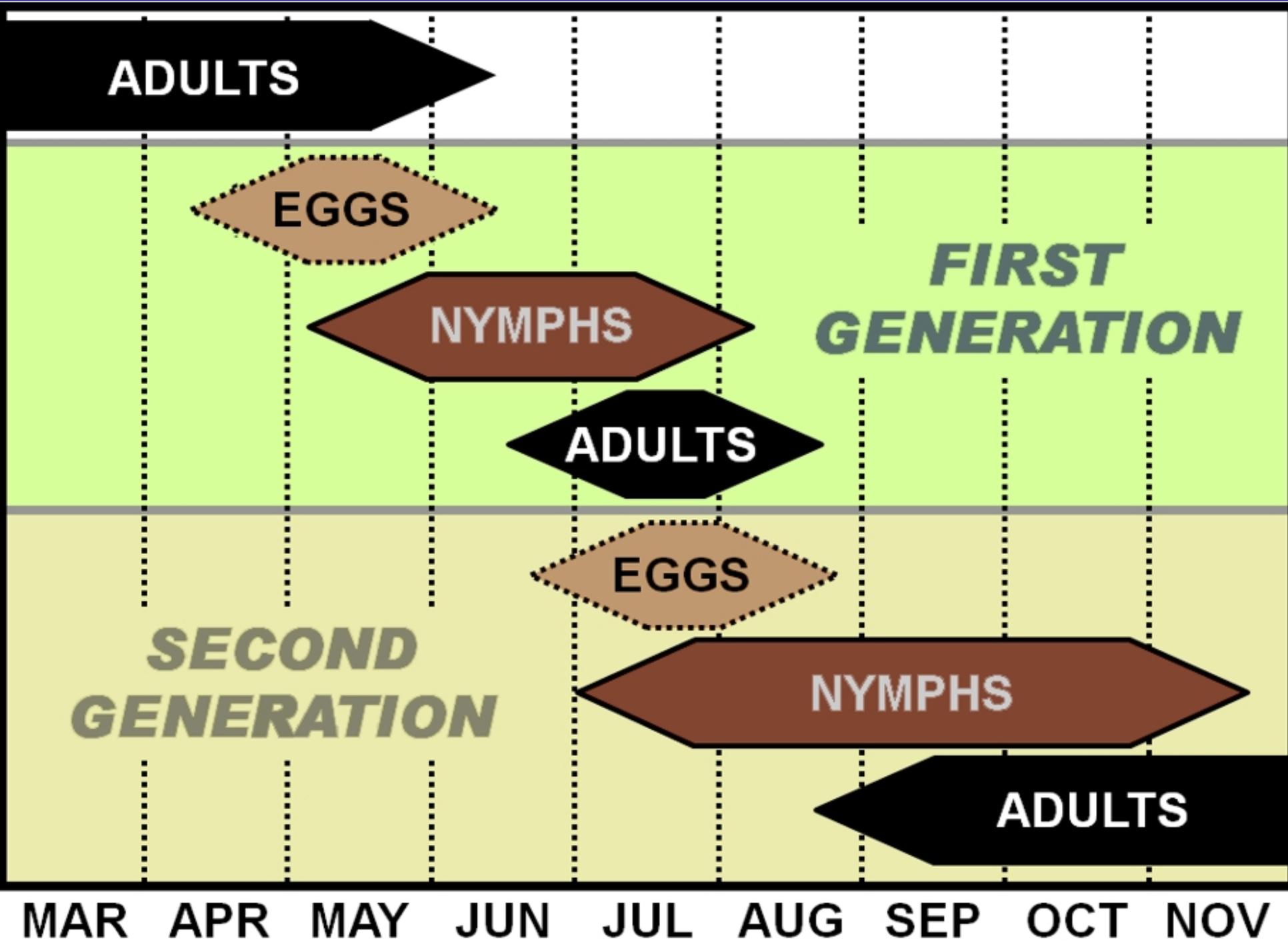
- Overwinter as adults
- 5 nymphal stages



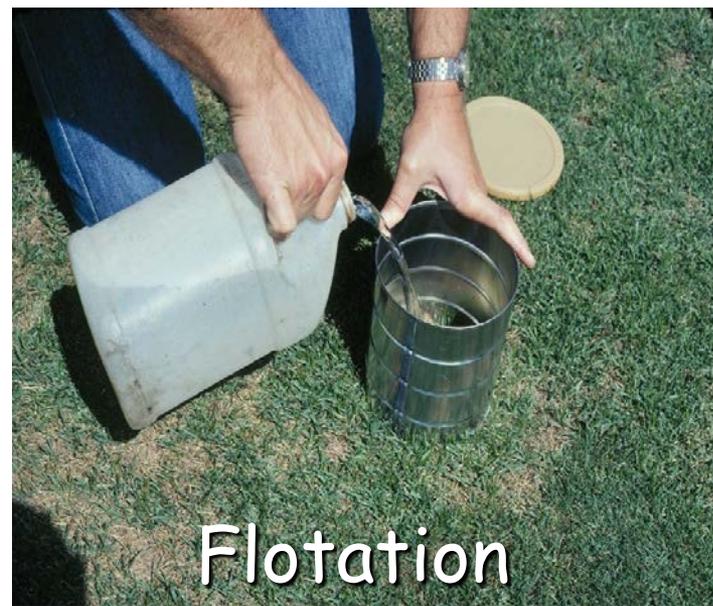
# Biology

## hairy chinchbug in New England

- one or two generations per year
- overwinter as adults in protected sites
- lay eggs in spring
- nymphs active all summer
- most damage in July and August



# Chinch Bug Sampling







# Vacuum Sampling





Where to Look



# Favorable conditions

## Chinchbugs

- sandy soils, soils that drain well
- exposed areas
- thick or dense thatch
- fine fescues, creeping bentgrass  
(and other cool season grasses)

# Cultural Practices

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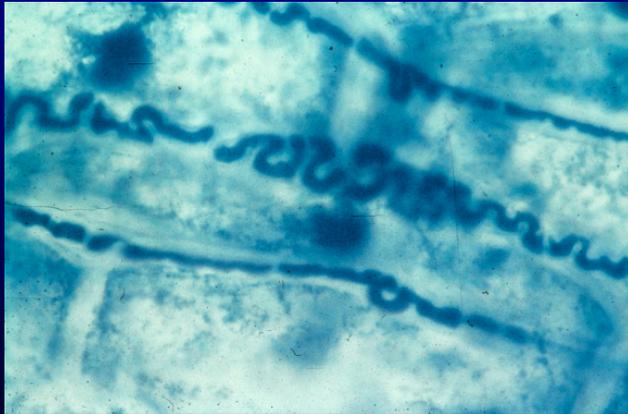
- Plant well-adapted turfgrasses
  - Maintain healthy, vigor turf
  - Reduce thatch/organic debris
- Endophyte-enhanced tall fescue and perennial ryegrass cultivars



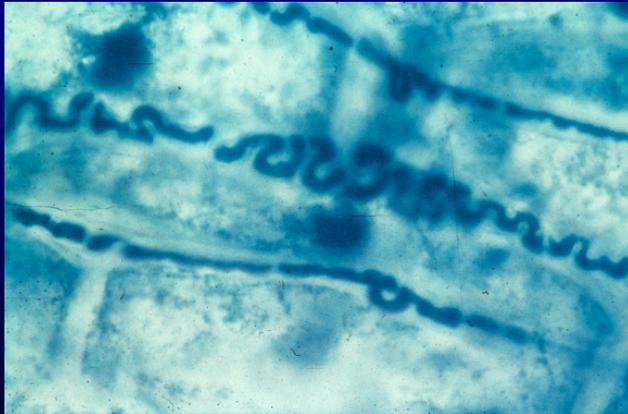
# Endophytes



- Fungi that produce substances toxic to insects

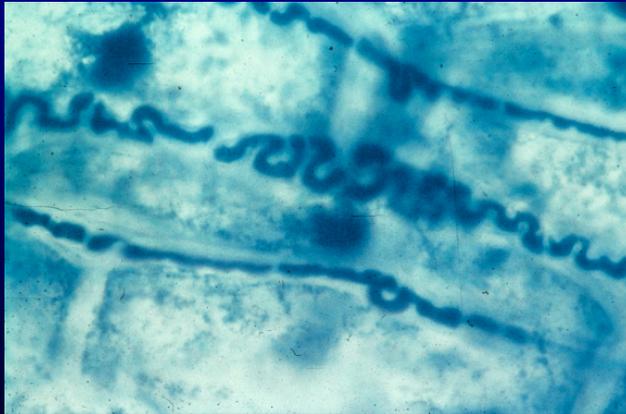


# Endophytes



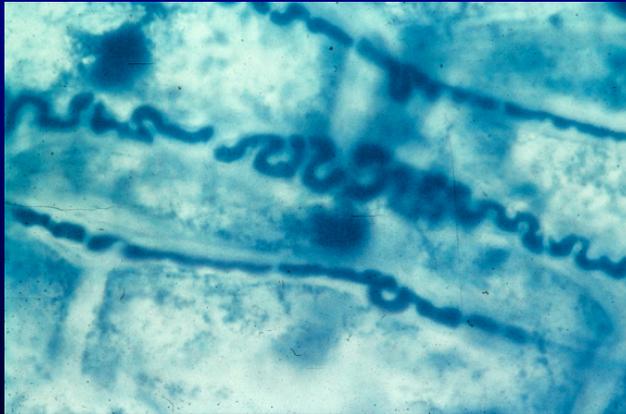
- Fungi that produce substances toxic to insects
- Available in some fescues and perennial ryegrasses

# Endophytes



- Fungi that produce substances toxic to insects
- Available in some fescues and perennial ryegrasses
- Effective against chinchbugs, billbugs, and some webworms

# Endophytes



- Fungi that produce substances toxic to insects
- Available in some fescues and perennial ryegrasses
- Effective against chinchbugs, billbugs, and some webworms
- **Provide good drought tolerance too**

# Big-eyed bug



# Chemical Control

## Chinchbugs

- Use something that stays in the thatch (e.g., pyrethroids or combination products)
- Water in lightly

# Chemical Control

## Pyrethroids

- bifenthrin (Talstar™)
- cyfluthrin (Tempo™)
- lambda-cyhalothrin (Scimitar™)
- deltamethrin (Deltagard™)

Water very lightly



Questions???



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